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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,095	03/01/2004	Yong Gang Jin	27-067.D1	2465
22898	7590	01/27/2005	EXAMINER	
THE LAW OFFICES OF MIKIO ISHIMARU 1110 SUNNYVALE-SARATOGA ROAD SUITE A1 SUNNYVALE, CA 94087			NGUYEN, THANH T	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 01/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/791,095

**Applicant(s)**

JIN ET AL.

**Examiner**

Thanh T. Nguyen

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 06 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 30-45 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 30-45 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments with respect to claims 30-45 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 30-45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation “said base having said torch bump bonded to the flat top area at a flat bottom area of the torch bump, said flat top area is larger than the flat bottom area” renders the claim indefinite because it is unclear what the applicant try to claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 30-31, 36-37, 41-44 are rejected under 35 U.S.C. 102(e) as being anticipated by Chin et al. (U.S. Patent No. 6,541,366).

Referring to figures 2a-2c, Chin et al. teaches a structure for a torch bump, comprising:

A substrate (8) having been provided with a contact pad (10);

A layer of passivation (12, see figure 2a);

A UMB (14a, see figure 2a);

A base of the torch bump (14b/14c) having a flat top area (see figure 2a);

The torch bump (18b, called bump) bonded to the flat top area of the base (see figure 2a-2c);

Flat bottom area of the base of the torch bump is smaller than the flat top area of the torch bump (see figure 2a-2c).

Regarding to claim 31, the base of the torch bump further comprising a first layer (14b, the second layer (the bottom portion of layer 14c), and the third layer (the top portion of layer 14c) on the second layer (see figure 2a-2c).

Regarding to claim 36, the top of the first layer is flat (14b, see figure 2a).

Regarding to claim 37, the first layer of solder deposited over the exposed surface of the UMB, and second layer of eutectic solder (18a/18b, see col. 5, lines 42-53)

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Regarding to claim 41, layer of UMB having been etched using the created base of the torch bump and the created layer of solder as a mask (see figures 2a-2c).

Regarding to claim 42, the first layer, the second layer, and the third layer have flat top area (14/14c, see figure 2a-2c).

Regarding to claim 43, the diameter of the base of the torch bump is larger than the diameter of the torch bump which is larger than the diameter of the flat bottom area (see figure 2c, noted the smallest the diameter of the torch bump is smaller the base of the torch bump)

Regarding to claim 44, the third layer has flat top area (48, the top portion of layer 48, see figure 14).

Claims 30-31, 36, 41-42, 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al. (U.S. Patent No. 6,426,281).

Referring to figures 11-17, Lin et al. teaches a structure for a torch bump, comprising:

A substrate (30) having been provided with a contact pad (32);

A layer of passivation (34, see figure 11);

A UMB (36, see figure 12);

A base of the torch bump (46/48) having a flat top area (see figure 14);

The torch bump (50, called solder bump) bonded to the flat top area of the base (see figure 15-17);

Flat bottom area of the base of the torch bump is smaller than the flat top area of the torch bump (see figure 14-17).

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Regarding to claim 31, the base of the torch bump further comprising a first layer (46, the second layer (the bottom portion of layer 48), and the third layer (the top portion of layer 48) on the second layer (see figure 14).

Regarding to claim 36, the top of the first layer is flat (46, see figure 14).

Regarding to claim 41, layer of UMB having been etched using the created base of the torch bump and the created layer of solder as a mask (see figures 16-17).

Regarding to claim 42, the first layer, the second layer, and the third layer have flat top area (46/48, see figure 14).

Regarding to claim 44, the third layer has flat top area (48, the top portion of layer 48, see figure 14).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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Claim 32-35, 37-40, 43, 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lin et al. (U.S. Patent No. 6,426,281) as applied to claims 30-31, 36, 41-42, 44 above in view of the Admitted Prior Art of the Present Invention (pages 15-16) and Chin et al. (U.S. Patent No. 6,541,366).

Lin et al. teaches all of the limitations as described in the claimed invention above. However, Lin et al. does not teach the layer of UBM comprising nickel, forming a gold layer over the nickel layer, forming a solder layer of eutectic solder paste, the diameter of the base of the torch bump is larger than the diameter of the torch bump which is larger than the diameter of the flat bottom area and the thickness of the layers and the specific thickness and diameter of layer.

The Admitted Prior Art teaches forming layer of UBM comprising nickel (18, see page 4-5), a base of the solder ball comprising a layer of copper, a layer of nickel, followed by a layer of gold (pages 5-6).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention was made would form a base of the solder ball comprising a layer of copper, a layer of nickel, followed by a layer of gold in process of Chiu et al. as taught by the Admitted Prior Art because the process is known in the art to create a solder ball

Chin et al. teaches forming a solder layer by using eutectic solder paste (see col. 5, lines 48-53), (see figure 2c, noted the smallest the diameter of the torch bump is smaller the base of the torch bump).

Therefore, it would have been obvious to a person of ordinary skill in the requisite art at the time of the invention of the invention was made would form a solder layer by using eutectic

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solder paste in process of Lin et al. as taught by Chin et al. because the process would provide a high performance solder bump, also determining the optimum material for the layer only involved routine skill in the art.

The thickness range of the metal layers and the dry films are considered to involve routine optimization while has been held to be within the level of ordinary skill in the art. As noted in *In re Aller* 105 USPQ233, 255 (CCPA 1955), the selection of reaction parameters such as temperature and concentration would have been obvious:

“Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed “critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.”

*In re Aller* 105 USPQ233, 255 (CCPA 1955). See also *In re Waite* 77 USPQ 586 (CCPA 1948); *In re Scherl* 70 USPQ 204 (CCPA 1946); *In re Irmscher* 66 USPQ 314 (CCPA 1945); *In re Norman* 66 USPQ 308 (CCPA 1945); *In re Swenson* 56 USPQ 372 (CCPA 1942); *In re Sola* 25 USPQ 433 (CCPA 1935); *In re Dreyfus* 24 USPQ 52 (CCPA 1934).

Therefore, one of ordinary skill in the requisite art at the time the invention was made would have used any thickness range suitable to the method in process of Lin et al. in order to optimize the process.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).




A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh Nguyen whose telephone number is (571) 272-1695, or by Email via address Thanh.Nguyen@uspto.gov. The examiner can normally be reached on Monday-Thursday from 6:00AM to 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached on (571) 272-1702. The fax phone number for this Group is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956 (**See MPEP 203.08**).

  
Thanh Nguyen  
Patent Examiner  
Patent Examining Group 2800

TTN